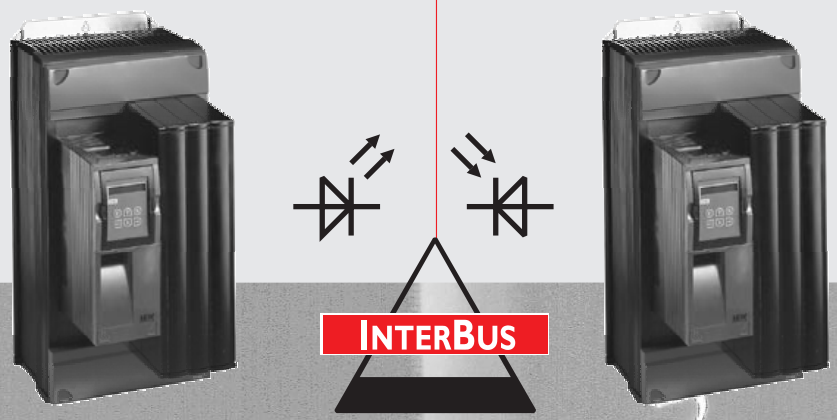
SEW EURODRIVE

MOVIDRIVE® DFI21A Fieldbus Interface
INTERBUS with Fiber Optic Cable

Edition

10/2000



Manual

0918 7219 / EN

SEW
EURODRIVE

SEW-EURODRIVE

1 Introduction 4
1.1 Features of the DFI21 option 6

2 Assembly / Installation Instructions 7
2.1 Supported device types 7
2.2 Installation of option card 7
2.3 INTERBUS topologies with DFI21 option 9
2.4 Bus connection via fiber optics 11
2.5 Installing fiber optic connectors 11
2.6 Setting of the DIP switches 13
2.7 Display elements 15

3 Project Planning and Startup 18
3.1 Startup of the drive inverter 18
3.2 Project planning of the INTERBUS system 20
3.3 Testing the PCP connection 26

4 The PCP Interface 28
4.1 Basic overview 28
4.2 The PCP services 29
4.3 Parameters in the object directory 31
4.4 Parameterization return codes 37

5 Application Examples 40
5.1 Control via process data 40
5.2 Parameterization via PCP Interface 40
5.3 Representation of coding examples 41
5.4 Procedure of a parameterization sequence 41
5.5 Reading a drive parameter 42
5.6 Writing a drive parameter 43
5.7 Writing IPOS variables / parameters via MOVILINK® parameter channel 44
5.8 Reading IPOS variables / parameters via MOVILINK® parameter channel 44
5.9 Writing several IPOS variables / parameters via download parameter block 46

6 Appendix 48
6.1 Compatibility with DFI11 (RS485 Cu) 48
6.2 Check list for installation of fiber optic cables 49

7 Index 50

1 Introduction

Contents of this manual

This manual accompanies the DFI21A INTERBUS option with fiber optic cable and describes the installation of the INTERBUS DFI21A option card in the drive inverter and the startup of the MOVIDRIVE® unit in the INTERBUS fieldbus system.

It also contains an explanation of all settings on the fieldbus option card and connection variants with INTERBUS in the form of small startup examples.

Documentation

For a simple and effective connection of MOVIDRIVE® to the INTERBUS fieldbus system, the following documentation should be used in addition to this manual:

- Manual for MOVIDRIVE® fieldbus unit profile (publication no. 0919 1607)
- MOVIDRIVE® system manual (publication no. 0919 1100)

The manual accompanying the MOVIDRIVE® fieldbus unit profile features a description of fieldbus parameters and related coding. It also features an explanation of the various control schemes and possible applications in form of small examples.

The parameter list is a list of all drive inverter parameters that can be read and written via various communication interfaces such as an RS-485, SBus and even the fieldbus interface.

MOVIDRIVE® and INTERBUS

The MOVIDRIVE® drive inverter together with the DFI21A option and its high-performance universal fieldbus interface enable the connection to higher-level automation systems via the open and standardized INTERBUS fieldbus system.

Unit profile

The performance of the inverter (also referred to as the unit profile) that forms the basis for INTERBUS operation, is fieldbus-independent and, therefore, uniform. This allows the user to develop fieldbus-independent drive applications. Thus, a change to other bus systems such as PROFIBUS (DFP 11 option) or DeviceNet (DFD 11 option) can be easily accomplished.

Drive parameters

Use of the MOVIDRIVE® INTERBUS interface offers digital access to all drive parameters and functions. Control of the drive inverter is achieved through the fast, cyclical process data. This process data channel offers the opportunity to initiate various drive functions such as release, controller inhibit, normal stop, quick stop, etc., and to specify setpoint values such as setpoint speed, integrator time for acceleration/ramp down, etc.

At the same time, this channel may also be used to read back actual values from the drive inverter, such as actual speed, current, device condition, error code or even reference messages.

READ/WRITE

While the process data exchange generally occurs cyclically, the drive parameters can be read or written only acyclically via the READ and WRITE services. This parameter data exchange allows for applications in which all important drive parameters are "filed" in the higher-level automation device. The result is that no manual and frequently time-consuming parameterization must be performed at the drive inverter.

Startup

In general, the INTERBUS option card is designed so that all INTERBUS-specific settings such as process data length and baud rate are made through a hardware switch on the option card. Using this manual setting, the drive inverter can be integrated into the INTERBUS system and switched on quickly.

The parameterization can be performed automatically by the higher-level INTERBUS master (parameter download). This trend-setting variant offers the advantage of reducing system startup time and simplifying the documentation of the application program since all important drive parameters can be saved directly in the control program.

Monitoring functions

The use of a fieldbus system requires additional drive system monitoring such as time-monitoring of the fieldbus (fieldbus timeout) or even special emergency stop concepts. The MOVIDRIVE® monitoring functions can be customized to your applications. The user can thus determine which fault response the drive inverter will trigger in case of a bus error. A quick stop is useful for many applications, but the user can also cause a freeze of the last setpoint values so that the drive runs continuously using the last valid setpoint values (e.g., a conveyor belt). Since the functionality of the control terminals is ensured in fieldbus operation, the user can still implement fieldbus-independent emergency stop concepts via the terminals of the drive inverter.

Diagnostics

The MOVIDRIVE® drive inverter offers numerous diagnostic options for startup and service.

Using the integrated fieldbus monitor, users can control setpoint values sent from the higher-level controller as well as the actual values. The MOVITOOLS software package offers a convenient diagnostic option that allows for a detailed display of fieldbus and device state information in addition to the settings of all drive parameters (including fieldbus parameters).

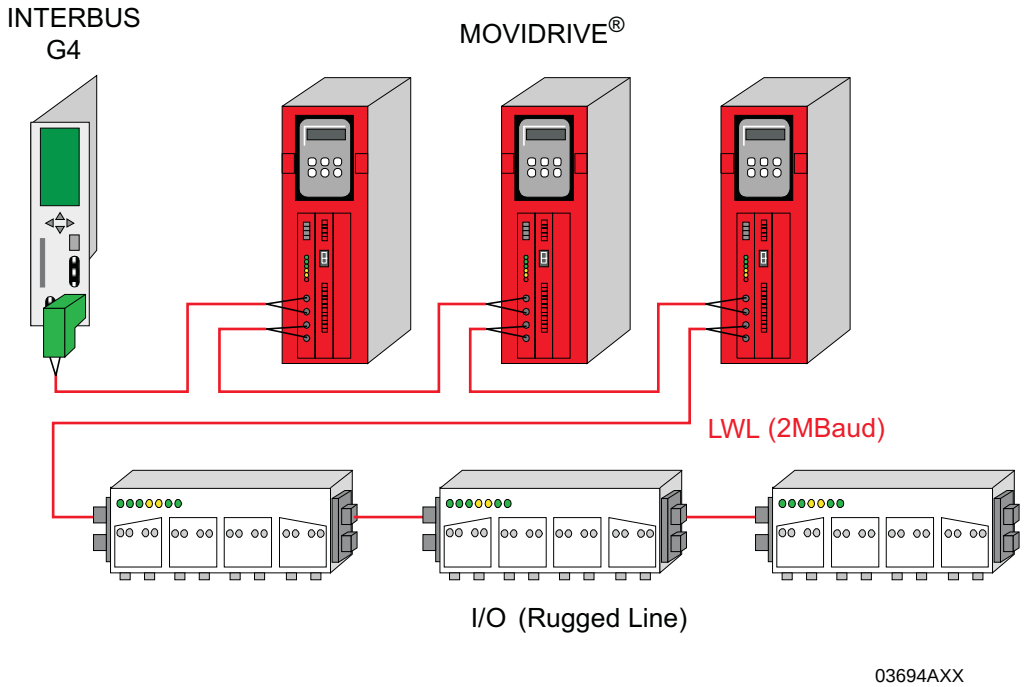


Figure 1: Typical design of an INTERBUS fiber optic system

1.1 Features of the DFI21 option

Only the transfer medium of the INTERBUS changes for the user through the bus cabling with fiber optic cables, i.e. bus design, project planning and programming in the control system are not affected by the use of a fiber optic cable.

The DFI21 option for the MOVIDRIVE® drive inverters is characterized by the following features:

Latest fiber optic technology	Through the use of Supi-3 OPC (Optical Protocol Chip) technology, the light intensity (output power) of the fiber optic components of the DFI21 is controlled automatically, so that the fiber optic segment is always operated at optimum light intensity. At the same time, this procedure allows for permanent quality monitoring of the optical transmission line.
Integrated detection of bus end	The DFI21 recognizes automatically whether another participant is connected to the continuing interface.
500 kbps and 2 Mbps	Using a corresponding DIP switch, the DFI21 can be used in 500 kbps and in 2 Mbps INTERBUS systems.
1–6 Process data words **1–4 PCP words**	The DFI21 supports a maximum of six input and output words in the INTERBUS protocol. Classifiying these six words into process and PCP data is accomplished with the DIP switches. Thus, an application-specific optimum INTERBUS interface can be implemented between control system and drive inverter.
Two PCP channels with PCP version 3	Besides the PCP communications connection with a control system, the DFI21 also supports a direct PCP connection to the INTERBUS interface module. This PCP connection can be used for startup, programming and diagnostics of drive inverters via an additional management PC on the production control level.
Compatibility with DFI11A	Applications with DFI11A (RS-485 remote bus) can be changed to fiber optics via DFI21 without changing the project planning and programming of the control system.
Part number	823 093 5

2 Assembly / Installation Instructions

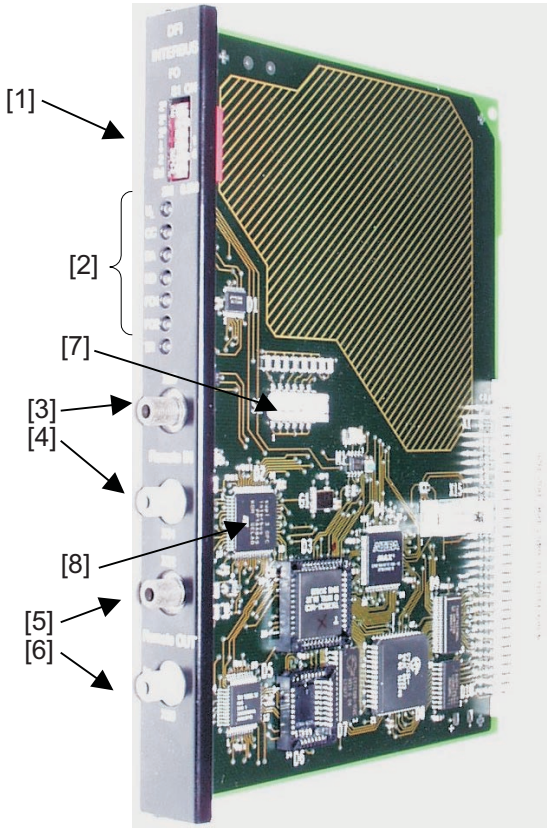
2.1 Supported device types

The DFI21A option for INTERBUS connection can be used with all drive inverters in the MOVIDRIVE® series.

2.2 Installation of option card

Before you begin

- Discharge your body of electrostatic energy by using appropriate means (anti-static band, conductive shoes, etc.) before touching the option card.
- Keep option card in its original packaging and remove it only when you are ready to install it.
- Avoid frequent touching of the option card and hold the card only at the edges. Do not touch any components.



03696AXX

Figure 2: DFI 21 option card for INTERBUS fiber optics

[1] DIP switch for process data length, PCP length and baud rate

[2] Diagnostics LEDs

Incoming fiber optic cable remote bus (Remote IN) / [3] Receiver / [4] Sender

Continuing fiber optic cable remote bus (Remote OUT) / [5] Receiver / [6] Sender

[7] Fiber optic cable balance (do not change!)

[8] Supi3 OPC

Installation of option card

- Disconnect the supply voltage of the inverter. Switch off the supply voltage and the 24 V supply, if necessary.
- Remove lower cover of control unit.
- Unscrew electronics shield terminal.
- Remove black cover plate.
- Insert option card into guide rails of OPTION1 slot and push into slot.
- Apply moderate pressure to the front plate of the option card while pushing it into the slot.
- Fasten electronics shield terminal. If the electronics shield terminal cannot be fastened, the option card was not inserted correctly.
- Replace cover of control unit.
- Do not remove the protective cover of the fiber optics output and input until you are ready to plug in the fiber optics connectors.
- Depending on the fiber optics connector used, the installation of the cover may not be possible. This does not affect the enclosure type of the device.
- The installation of the DFI21A option card is now complete.
- **Fiber optic connections not in use must remain closed using a dust-proof protective cover.**

2.3 INTERBUS topologies with DFI21 option

Using the DFI21 option, the drive inverter is connected to an INTERBUS fiber optics remote bus. By setting the baud rate, the DFI21 may be operated in 500 kbps and 2 Mbps installations. Although the DFI21 supports the optical control of the transmitter power, non-controlled fiber optic phases can also be formed if the previous or following participant does not support optical control.

Installation examples for various bus topologies are listed below.

Direct interface with 2 Mbps

The implementation of INTERBUS networks with optically controlled fiber optic technology and a transfer rate of 2 Mbps offers the most efficient networkable solution with DFI21.

System requirements

Interface	INTERBUS G4 interface module with optical system diagnostics (e.g. S7 400 ETH DSC) and optically controlled fiber optics interface or optical converter (RS485/fiber optics), e.g. IBS OPTOSUB AK-MA/M/R-LK
CMD tool	version 4.50A or higher
Interbus participants	all INTERBUS components must support 2 Mbps

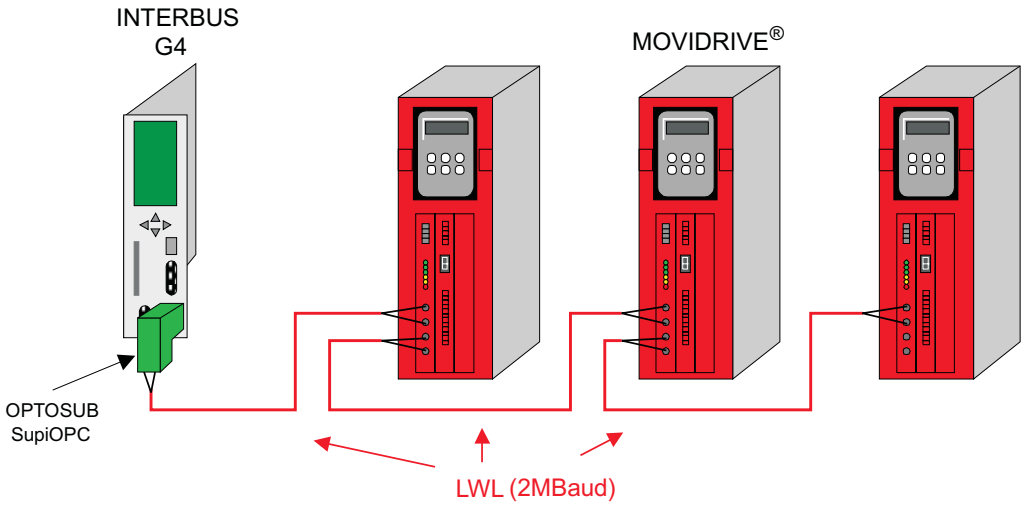


Figure 3: 2 Mbps application with optically controlled fiber optics remote bus

All installed components must support the baud rate of 2 Mbps and optical control in order to obtain an optimal system. It is possible to interface INTERBUS participants with and without optical control of transmitter power.

RS-485/fiber optics mixed operation with 500 kbps

System requirements

The DFI21 may also be used for the installation of sections of fiber optic lines within an RS485 network.

Interface	all INTERBUS G4 interface modules
CMD tool	version 4.50 or higher
Interbus participants	all types of INTERBUS participants with RS485 or fiber optics technology (500 kbps)
Optical converters (Polymer/HC)	for incoming remote bus interface: OPTOSUB-PLUS-K/IN; for continuing remote bus interface: OPTOSUB-PLUS-K/OUT

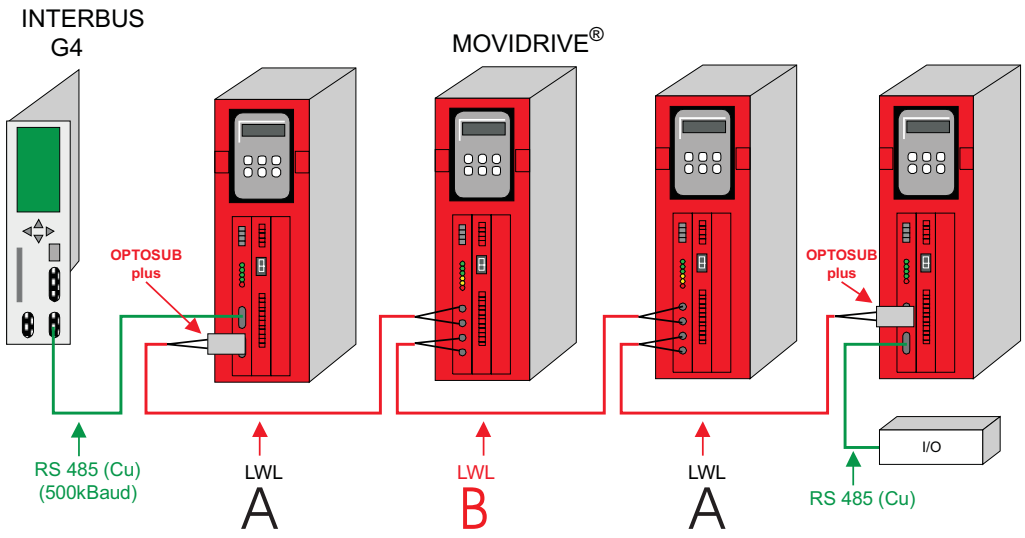


Figure 4: INTERBUS system with fiber optics remote bus segment

A = uncontrolled fiber optics remote bus

B = optically controlled fiber optics remote bus

Figure 4 shows an installation example for mixed operation with RS-485 and fiber optics bus interface with INTERBUS options DFI11 (RS-485) and DFI21 (fiber optics).

The first drive inverter is coupled with the interface module via an RS-485 bus interface. The outgoing remote bus interface is converted to fiber optics technology using an OPTOSUB-PLUS-K/OUT and sent to the fiber optics Remote IN interface of the second inverter. This segment does not feature an optical control since it is not supported by the converter.

Data transfer between second and third inverter is accomplished with optically controlled transmitter power. Interfacing the fourth inverter requires a conversion to RS-485 technology by using OPTOSUB-PLUS-K/IN. This last fiber optics segment is once again operated without optical control since it is not supported by OPTOSUB-PLUS.

In general, the optical control is independent of the utilized firmware version of the interface module since it is implemented on the ASIC level between INTERBUS participants. In order to evaluate the optical system diagnostics, firmware version V4.44 or higher is required for the INTERBUS interface module.

2.4 Bus connection via fiber optics

Bus interfacing for DFI21 is done exclusively via fiber optics. Polymer fiber cables and HCS cables may be used for this purpose.

Polymer fiber cable

This type of cable is used for distances up to 70 meters between two interbus participants. Depending on the operating range, several designs are available. This type of cable distinguishes itself through simple and cost-effective installation.

HCS cable

This type of cable can be used for distances up to 500 meters since it incurs considerably lower light attenuation compared to polymer fibers.

The bus cable must be at least 1 meter long. For shorter distances, cable jumpers from Phoenix Contact must be used.

Note!

Advanced information on proper routing of fiber optic cables can be found in the fiber optic installation guidelines from Phoenix Contact (item designation IBS SYS FOC ASSEMBLY).

The appendix contains a checklist for the installation of fiber optic cables.

2.5 Installing fiber optic connectors

F-SMA connectors are used to connect the fiber optic cable to the DFI21 option. Two connectors each (sender and receiver) are required for the incoming and outgoing remote bus. In order to maintain optimum bending radius, the use of F-SMA connectors with kink protection is recommended.

Ordering information

For F-SMA connectors (e.g. from Phoenix Contact)

Designation	Part designation
F-SMA connector set for polymer fiber cable (4 pieces) with kink protection	PSM-SET-FSMA/4-KT

Connector pin assignment

For INTERBUS remote bus with fiber optics

Table: Connector pin assignment

Position in	Signal	Direction	Color of fiber optics cable core
1	Fiber optics remote IN	Input data	orange (og)
2	(incoming remote bus)	Output data	black (bk)
3	Fiber optics remote OUT	Input data	black (bk)
4	(continuing remote bus)	Output data	orange (og)

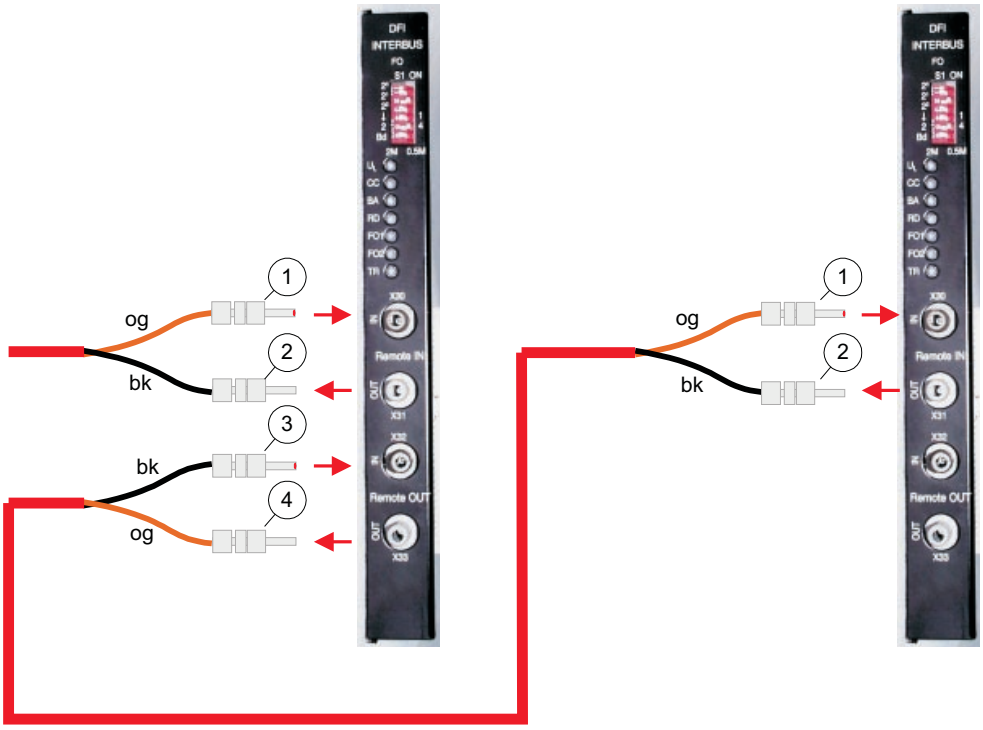
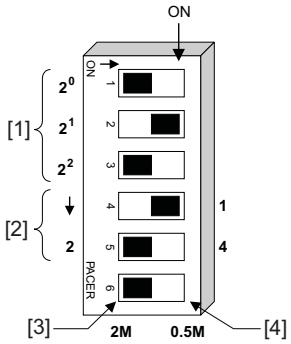


Figure 5: Fiber optics cable – connector pin assignment DFI21

2.6 Setting of the DIP switches

The six DIP switches S1-1 through S1-6 on the front side of the option are used for setting the process data length and PCP length as well as selecting the baud rate.



DIP switch assignment of DFI21

[1] Number of process data (1 ... 6 words)

[2] Number of PCP words (1, 2 or 4 words)

Baud rate: [3] OFF: 2 Mbps / [4] ON: 0.5 Mbps

The figure depicts the following settings:
Process data width: 2 PD
Number of PCP words: 1 PCP
Baud rate: 2 Mbps

Note

Before any DIP switches are changed, the drive inverter must be disconnected from power (supply voltage and 24 V back-up operation). The settings of DIP switches S1-1 through S1-5 are performed only during initialization of the drive inverter.

If incorrect settings of the DIP switches are present, the drive inverter responds with ID code "Microprocessor not ready" (38 hex).

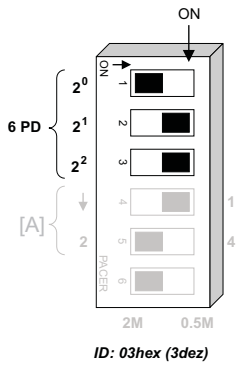
Setting the baud rate

DIP switch S1-6 is used to set the baud rate. Changing the baud rate takes effect immediately and may interrupt the current data communication of the Interbus.

Setting the process data length and PCP length

A maximum of six Interbus data words can be exchanged between the INTERBUS interface module and the DFI21 option. These data words can be distributed to the process data channel and the PCP channel using DIP switches S1-1 through S1-5. The limit of six data words results in settings that cannot be mapped onto the Interbus.

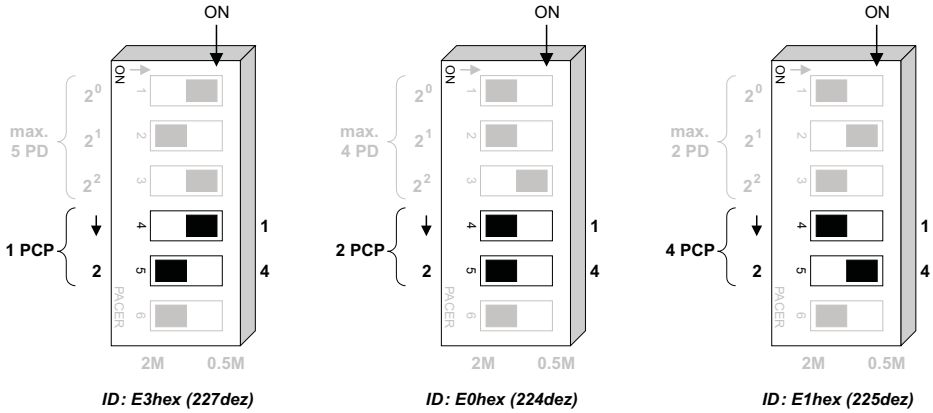
In case of an incorrect setting, the DFI21 responds with ID code "Microprocessor not ready" (38hex) and signals this incorrect setting with the red TR-LED. The following figure shows the limit conditions for the setting of process data length and PCP length with the following limits:



[A] PCP setting not in effect!

Settings for DFI21 operation with six process data

Process data length in words	PCP length	ID code
6	PCP setting not in effect; no PCP channel available	03hex (3dec)



Examples for setting PCP length and maximum process data length

PCP length	Maximum process data length	ID code
1 word	5 words	E3 hex (227dec)
2 words	4 words	E0 hex (224dec)
4 words	2 words	E1 hex (225dec)
	If maximum length is exceeded or for setting 0 or 7 PD	38 hex (56dec) = "Microprocessor not ready"

All settings not listed here result in the ID code "Microprocessor not ready." The inverter then signals "PD configuration" = 0PD in parameter P090 and indicates this incorrect setting by activating the red TR-LED on option DFI21.

2.7 Display elements

The DFI21 option card contains seven LEDs for diagnostics of the INTERBUS system. These LEDs indicate the current state of the DFI21 and the INTERBUS system (Figure 6).

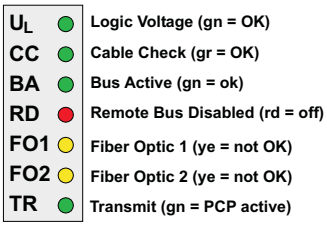
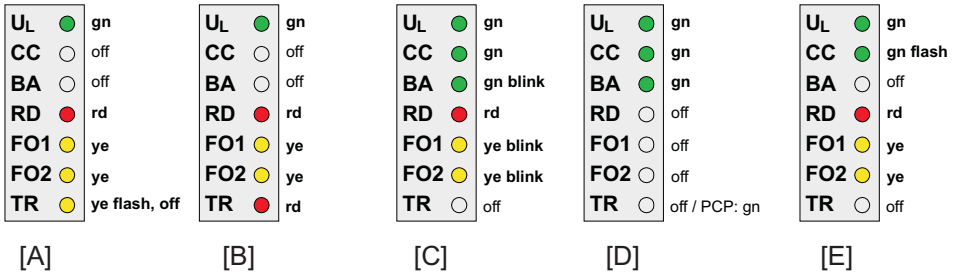

UL Logic Voltage (gn = OK)
CC Cable Check (gr = OK)
BA Bus Active (gn = ok)
RD Remote Bus Disabled (rd = off)
FO1 Fiber Optic 1 (ye = not OK)
FO2 Fiber Optic 2 (ye = not OK)
TR Transmit (gn = PCP active)
03705AXX

Figure 6: Diagnostics LEDs of DFI21

Figure 7 shows frequently occurring LED patterns of the diagnostics LEDs and their meanings. A detailed description of the LEDs can be found in the following tables.



03706AXX

Figure 7: Frequently occurring LED patterns

[A] Power-on of inverter (INTERBUS not yet active)

[B] Incorrect setting of DIP switches (INTERBUS not yet active)

[C] Initialization phase of INTERBUS system

[D] Correct INTERBUS operation

[E] Incorrectly set baud rate

LED UL "U-Logic" (green)

Status	Meaning	Fault correction
On	Power supply of bus electronics is present	-
Off	Power supply of bus electronics is missing	Verify that the option card is seated correctly and check the 24 V power supply of the inverter.

LED CC "Cable Check" (green)

Status	Meaning	Fault correction
On	Incoming remote bus connection is functioning porperly	-
Off	Incoming remote bus connection is malfunctioning	Check the incoming fiber optic remote bus and the LED FO1.

LED BA "Bus Active" (green)

Status	Meaning	Fault correction
On	Data transfer on INTERBUS is active	-
Off	No data transfer; INTERBUS stopped	Check the incoming remote bus cable. Use the diagnostic display on the INTERBUS interface module (master) to localize the fault further.

LED RD "Remote Bus Disable" (red)

Status	Meaning	Fault correction
On	Continuing remote bus switched off	-
Off	Continuing remote bus not switched off	-

LED FO1 "Fiber Optic 1" (yellow)

Status	Meaning	Fault correction
On	Monitoring of incoming fiber optic line. If the previous participant • possesses an optical line diagnostics, the system reserve of the optical transmission was undershot • does not possess an optical line diagnostics, a control of the optical transmission power is not possible	Check the incoming fiber optic cable for cable quality, correct connector installation, bending radius, etc. Use the optical diagnostics of the CMD tool or a fiber optic measurement instrument for further location of faults.
Off	Incoming fiber optic line is functioning properly	-

LED FO2 "Fiber Optic 2" (yellow)

Status	Meaning	Fault correction
On	Monitoring of continuing fiber optic line. If the next participant • possesses an optical line diagnostics, the system reserve of the optical transmission was undershot • does not possess an optical line diagnostics, a control of the optical transmission power is not possible	Check the continuing fiber optic cable for cable quality, correct connector installation, bending radius, etc. Use the optical diagnostics of the CMD tool or a fiber optic measurement instrument for further location of faults.
Off	Continuing fiber optic line is functioning properly	-

LED TR "Transmit" (green)

Status	Meaning	Fault correction
When the LED TR shows green, it corresponds to the Interbus standard.		
Off	No PCP communication	-
Green	PCP communication is active or INTERBUS start-up (parameter access via INTERBUS PCP channel)	-

LED TR "Transmit" (yellow or red)

Status	Meaning	Fault correction
The LED TR indicates system internal conditions with yellow and red that generally do not occur during INTERBUS operation.		
Off or green	Normal operation (see table for TR = green)	-
Flashing yellow	Inverter is currently in the initialization phase	-
Constant red	Selected incorrect DIP switch configuration, INTERBUS operation is not possible.	Check the settings of the DIP switches S1. Correct the settings of the DIP switches, if necessary, and switch the unit on again.
Flashing red	Incorrect DIP switch configuration or INTERBUS option card is defect, INTERBUS operation is not possible.	Check the settings of the DIP switches S1. If the settings are correct, contact the SEW Electronics Service.

3 Project Planning and Startup

This section describes the project planning and startup of the MOVIDRIVE® drive inverter with the DFI21A option in the INTERBUS interface module.

3.1 Startup of the drive inverter

After installating the fieldbus option card, the MOVIDRIVE® drive inverter can immediately be parameterized via the fieldbus system without any additional settings. For example, after power-on all parameters of the higher-level programmable controller can be set.

However, in order to control the drive inverter via the INTERBUS system, it must first be switched over to the control and setpoint source = FIELDBUS. Using the FIELDBUS setting, the drive inverter is parameterized to the control and setpoint transfer from the INTERBUS. The drive inverter now responds to the process output data sent by the higher-level programmable controller.

The activation of the control/setpoint source FIELDBUS is signalled to the higher-level controller using the "fieldbus mode active" bit in the status word. For safety reasons, the drive inverter must also be enabled on the terminal side for control via the fieldbus system. In accordance, the terminals must be connected or programmed so that the inverter is enabled via the input terminals.

The simplest way of enabling the drive inverter at the terminal side consists of connecting the input terminal DIØØ (Function/CONTROLLER INHIBIT) with a +24 V signal and programming the input terminals DIØ1 through DIØ3 to NO FUNCTION . Figure 8 shows an example of the procedure for the startup of the MOVIDRIVE® drive inverter with fieldbus interface.

Procedure for startup

1. Enable power output stage on the terminal side.

   Connect input terminal DIØØ / X13.1 (Function/CONTROLLER INHIBIT) to a +24 V signal, e.g. via device jumper.

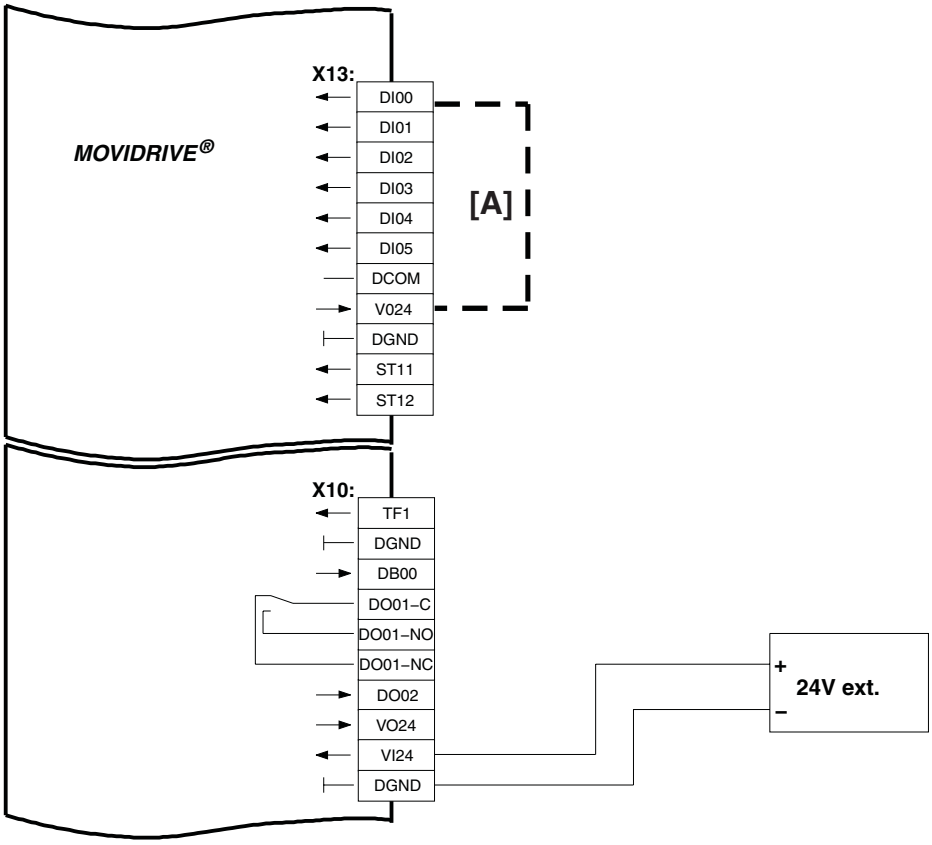


Figure 8: Wiring for enable

[A] The drive inverter can be enabled on the terminal side with this wire jumper!

X13	DI00: /Controller inhibit	**X10**	TF1: TF input
	DI01 ... X13:DI05: No function		DGND: Reference potential binary signals
	DCOM: Reference DI00 ... DI05		BB00: /Brake
	VO24: + 24 V		DO01-C: Relay contact
	DGND: Reference potential binary signals		DO01-NO: Relay NO contact
	ST11: RS-485 +		DO01-NC: Relay NC contact
	ST12: RS-485 -		DO02: /Malfunction
			VO24: + 24 V
			VI24: + 24 V (external)

2. Switch on 24 V power supply

   Only switch on the external 24 V power supply (not the supply voltage!) so that the drive inverter can be programmed.

3. Setpoint source = FIELDBUS / control source = FIELDBUS

   To control the drive inverter via fieldbus, program the setpoint source and the control source to FIELDBUS.

   - P100 setpoint source = FIELDBUS
   - P101 control source = FIELDBUS

4. Input terminals DIØ1 ... DIØ3 = NO FUNCTION

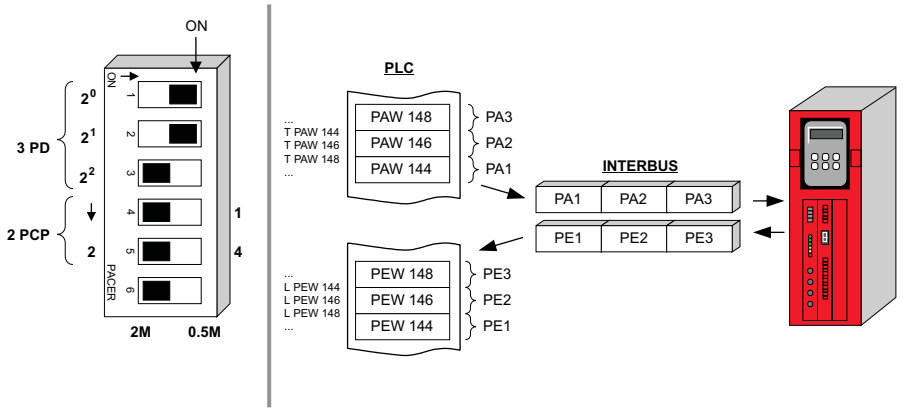
   Programm the functionality of input terminals X13.2, X13.3 and X13.4 to NO FUNCTION.

   - P600 programming terminal DIØ1 (X13.2) = NO FUNCTION
   - P601 programming terminal DIØ2 (X13.3) = NO FUNCTION
   - P602 programming terminal DIØ3 (X13.4) = NO FUNCTION

Further informationen on startup and control of the MOVIDRIVE® drive inverter can be found in the manual accompanying the fieldbus communications profile.

3.2 Project planning of the INTERBUS system

There are two steps involved in project planning for the drive inverter in the INTERBUS interface module using the project planning software "CMD-Tool" (CMD = Configuration-Monitoring-Diagnosis). The bus structure is created in the first step. Next, the participants are described and the process data are addressed.



03713AXX

Figure 9: Project planning example for 3PD + 2PCP

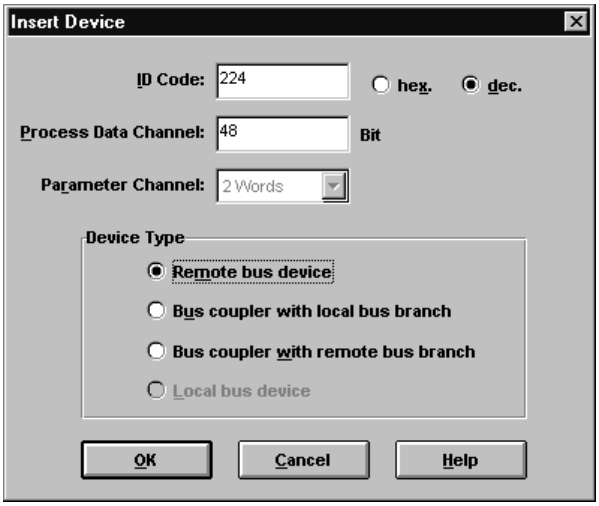
The following figures show the settings in the CMD tool for a drive inverter that is projected with the configuration 3PD + 2PCP in accordance with Figure 9 to the input/ output addresses 144...149 of the controller.

Configuring the bus structure

The bus structure can be configured online or offline using the CMD-Tool.

Offline configuration: Insert with ID code

In offline mode, the drive inverter is projected with the menu item "Edit / Insert with ID code" in the CMD tool. In accordance with Figure 10, the entries for ID code, process data channel and device type must be entered.



03714AXX

Figure 10: Offline configuration with CMD tool

Note!

Not all combinations are possible since the drive inverter can occupy a maximum of six words in the INTERBUS.

The following table shows the possible settings. The setting of the ID Code must correspond to the DIP switches S1-4 and S1-5 on the DFI21 option. The setting of the process data channel must correspond to the DIP switches S1-1 through S1-3 on the DFI21 option, otherwise INTERBUS operation is not possible.

Information on the offline configuration of DFI21 option with the CMD tool

	Program setting	Function (MOVIDRIVE® display)
ID code	227 dec (E3 hex)	Parameter channel: 1 word
Process data channel:	16 bit	1 process data word (Param+1PD)
	32 bit	2 process data words (Param + 2 PD)
	48 bit	3 process data words (Param + 3 PD)
	64 bit	4 process data words (Param + 4 PD)
	80 bit	5 process data words (Param + 5 PD)
ID code	224 dec (E0 hex)	Parameter channel: 2 words
Process data channel:	16 bit	1 process data word (Param+1PD)
	32 bit	2 process data words (Param + 2 PD)
	48 bit	3 process data words (Param + 3 PD)
	64 bit	4 process data words (Param + 4 PD)
ID code	225 dec (E1 hex)	Parameter channel: 4 words
Process data channel:	16 bit	1 process data word (Param+1PD)
	32 bit	2 process data words (Param + 2 PD)
ID code	3 dec (03 hex)	Parameter channel: -
Process data channel:	96 bit	6 process data words (6PD)

Online configuration: Configuration frame / Read in

The INTERBUS system can also be installed completely at first, and the DIP switches of the DFI21 option can be set. The CMD tool can be used to read in the entire bus structure (configuration frame). All stations are automatically detected with their data width settings.

Creating device descriptions

An individual device description for the drive inverter in the INTERBUS system can be designed for unique identification and description of the INTERBUS stations.

The following entries are important:

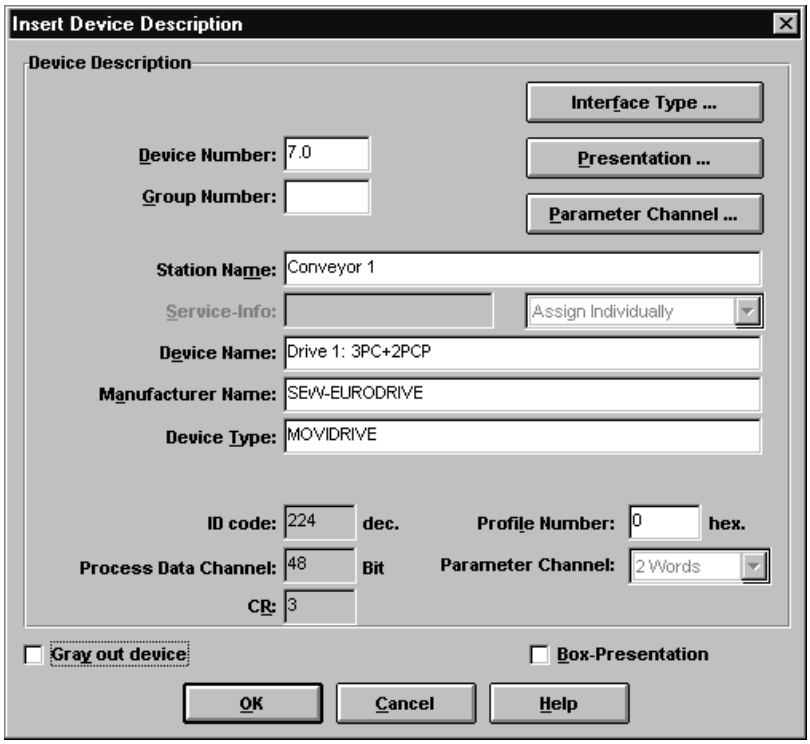
Station description

The fields "Manufacturer Name" and "Device Type" must be furnished with the entries

Manufacturer Name: SEW-EURODRIVE

Device Type: MOVIDRIVE

so that the parameters for the drive can be parameterized with a management PC from the production control level via the INTERBUS interface module (Figure 11).



03715AXX

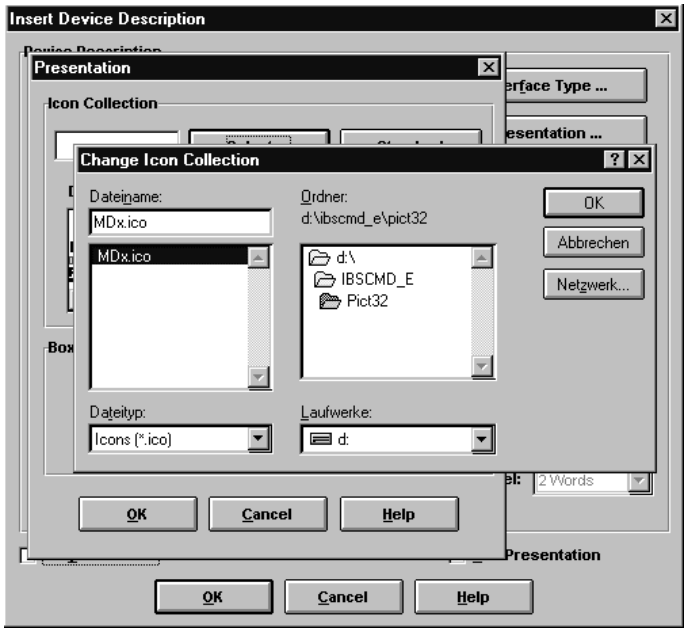
Figure 11: Station description for MOVIDRIVE® with DFI21

Interface type

Select "fiber optic remote bus" as interface type.

Representation

For simpler identification of the drive inverter, users can copy their own ICO files into the directory ".\IBSCMD\Pict32\" beginning with CMD tool version 4.50 (Figure 12). "INTERBUS Description Files for CMD tool" can be found on SEW's Internet pages at http://www.SEW-EURODRIVE.de under "Software / Produktunterstützende Software."



03716AXX

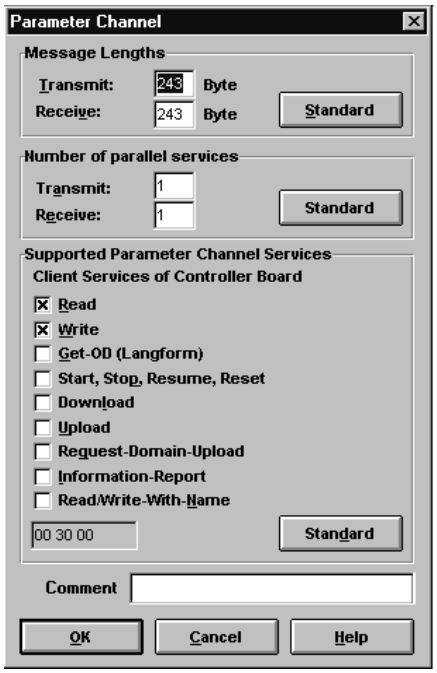
Figure 12: Linking the station description with ICO file

Parameter channel

The following settings of the parameter channel are necessary, if the PCP channel is to be used for parameterization of the drive inverter in your application:

- Message Lengths / Transmit / Receive:

  243 bytes each
- Supported Parameter Channel Services (standard): Read / Write .

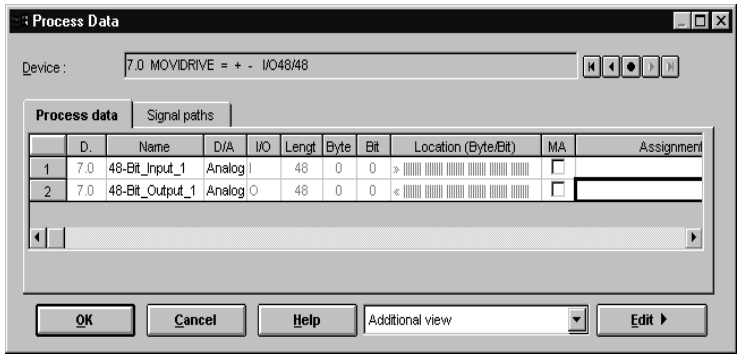


03717AXX

Figure 13: Setting of the parameter channel (PCP)

Assigning process data

INTERBUS process data of the drive inverter are assigned to the program addresses of the control system using the context menu "Process Data."



03718AXX

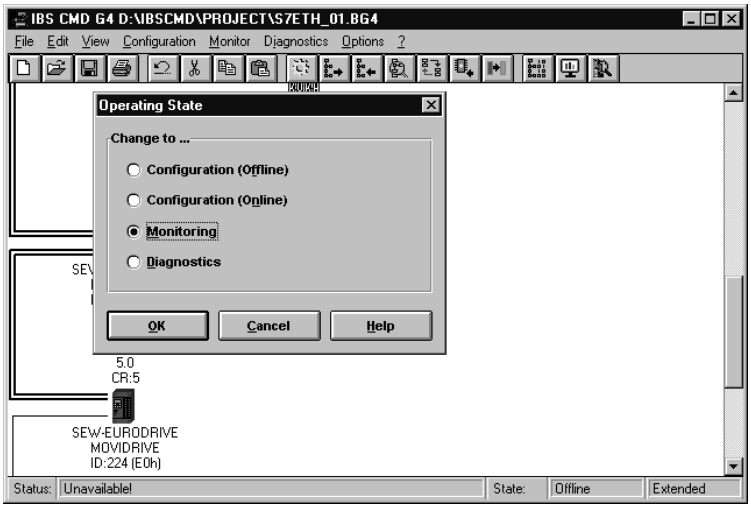
Figure 14: Assigning INTERBUS process data and PLC program addresses

A sample program (STEP7) for controlling the drive inverter using the process data of the INTERBUS can be found in Section 5.

3.3 Testing the PCP connection

The MONITOR mode of the CMD tools can be used to test the PCP connection to the drive inverter. The following figures illustrate the procedure for the PCP test. This procedure establishes a PCP connection to the device and reads the parameter list (object directory) saved in the device.

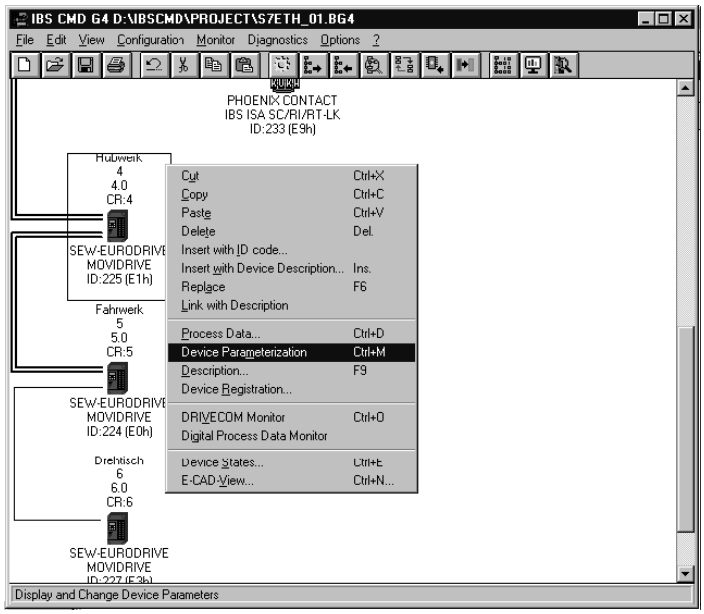
Switch the CMD tool to the "Monitoring" mode.



03719AXX

Figure 15: Switching the CMD tool to the "MONITORING" mode

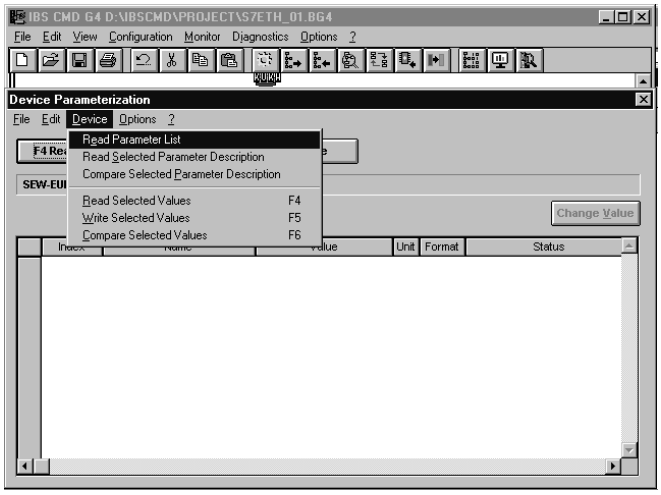
Click on the drive inverter to which you want to establish a PCP connection. Open the context menu by clicking the right mouse button and select the menu item "Device Parameterization."



03721AXX

Figure 16: Testing the PCP device parameterization

Activate the menu item "Device / Read Parameter List" in the "Device Parameterization" window.



03722AXX

Figure 17: Window for device parameterization via CMD tool

If the device parameters are read in, the project planning of the PCP channel was performed correctly. The read-in process can be aborted.

If an error message appears instead of the progress indicator, check the PCP configuration and allocation of CRs. If necessary, reformat the parameterization memory of the interface module and then write the current project into the parameterization memory again. Next, perform the parameterization of the interface module again and repeat this test sequence for checking the PCP connection.

03723AXX

Figure 18: CMD tool reads in device parameters, i.e. PCP communication is ok

4 The PCP Interface

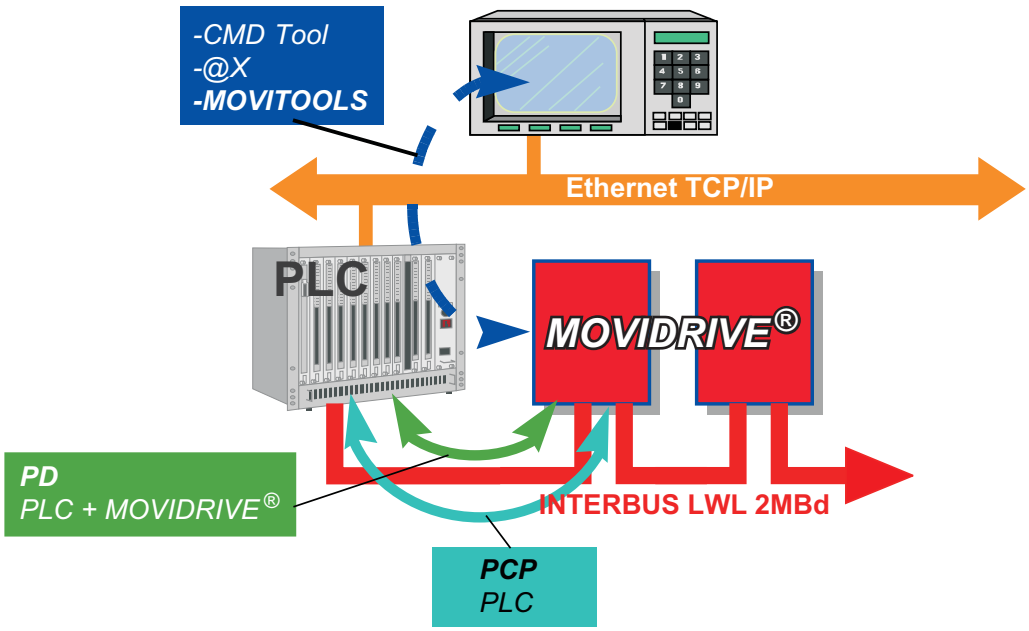
The MOVIDRIVE® drive inverter provides a standardized interface for parameterization via the optional DFI21A using the "Peripherals Communication Protocol" (PCP). This INTERBUS communications channel allows access to all drive parameters of the MOVIDRIVE® unit.

4.1 Basic overview

The PCP channel must be configured with the corresponding ID code in order to utilize access to parameter values of the drive inverter. One, two or four words are available in the INTERBUS protocol for the PCP channel. The access rate to parameter values via the PCP channel can be varied by the number of PCP words.

Additional PCP channel for startup and diagnostics

The PCP interface for DFI21 is implemented via PCP version 3. Apart from the known PCP channel between the programmable logic controller (PLC) and drive inverter, an additional (logical) PCP channel can now be established between interface module and drive inverter. Using this additional PCP channel, a supervisory computer can access the parameter values of the drive inverter via the Ethernet/Interbus communications path.



03725AXX

Figure 19: DFI21 communication channels with PCP version 3

Figure 19 shows an example of a systems topology with Ethernet TCP/IP level and INTERBUS level. An INTERBUS interface module with Ethernet TCP/IP interface that functions as gateway between the two communication levels is used for this purpose.

Besides the "CMD-Tool," the higher-level supervisory computer (Windows NT) is also running the INTERBUS "@utomationXplorer" and "MOVITOOLS" for programming and parameterization of SEW drive inverters on the INTERBUS. This arrangement allows for utilizing the existing bus infrastructure for startup and maintenance. This simplifies startup and diagnostics of the complete automation system since the INTERBUS cable is now used not only for control purposes but also for startup and diagnostics of all components used on the fieldbus.

4.2 The PCP services

The MOVIDRIVE® drive inverter with the DFI21A option supports the PCP services shown in Figure 20. However, only the services for

- Link establishment ("Initiate")
- Reading parameter values ("Read")
- Writing parameter values ("Write")
- Disconnecting ("Abort")

are important for the parameterization of the inverter. A detailed description of the PCP services can be found in the user manual for PCP communications of your INTERBUS interface module.

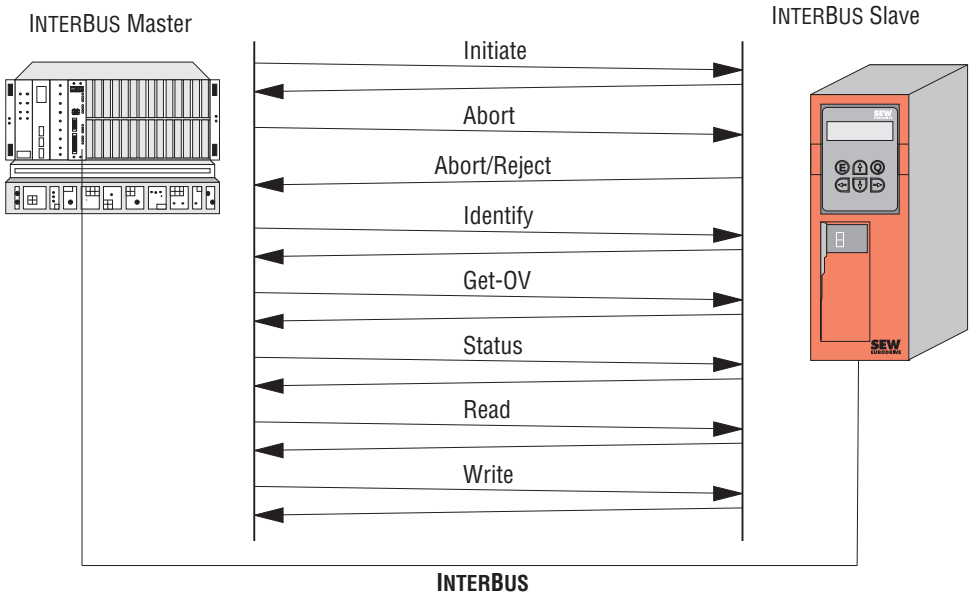


Figure 20: PCP services supported by MOVIDRIVE® drive inverter

Establishing a communications link with "Initiate"

The PCP service "Initiate" is used to establish a communications link for parameterization between an INTERBUS interface module and the MOVIDRIVE® drive inverter. In principle, the communications link is established from the INTERBUS interface module. During the link establishment, various settings concerning the communications link are checked, such as supported PCP services, data blocks, etc. After successful link establishment, the drive inverter answers with a positive "Initiate-Response." If the link could not be established, the settings concerning the communications link between INTERBUS interface module and MOVIDRIVE® drive inverter do not agree. The drive inverter answers with "Initiate-Error-Response." In this case, compare the list of configured communications relations of the INTERBUS interface module with that of the drive inverter (see Appendix A).

Any attempt to re-establish an already existing communications link is usually aborted. Subsequently, no communications link exists so that the PCP service Initiate must be executed a third time to re-establish the communications link.

Disconnecting the communications link with "Abort"

The PCP service "Abort" is used to disconnect an existing communications link between INTERBUS interface module and MOVIDRIVE® drive inverter. Abort is an unconfirmed PCP service that can be triggered by the INTERBUS interface module and by MOVIDRIVE®.

Reading parameter values with "Read"

The PCP service "Read" is used to grant the INTERBUS interface module read access to all communications objects (drive parameters) of the MOVIDRIVE® drive inverter. The documentation MOVIDRIVE® Fieldbus Device Profile and Parameter List contains a detailed listing of all drive parameters and their coding.

Writing parameter values with "Write"

The PCP service "Write" is used to grant the INTERBUS interface module write access to all MOVIDRIVE® drive parameters. If a drive parameter is accessed incorrectly (e.g. written value is too high), the drive inverter generates a "Write-Error-Response" with exact information on the cause of the error.

4.3 Parameters in the object directory

Using the PCP services "Read" and "Write," the INTERBUS interface module can access all parameters defined in the object directory of the DFI21. All drive parameters accessible via the bus system are defined as communications objects in the static object directory of the DFI21. All objects of the static object directory are addressed using indexes. The following table shows the structure of the object directory of the DFI21 for the MOVIDRIVE® drive inverter.

The index range is divided into three logical sections. Indexes 8300 … 8800dec are used to address the drive parameters. The parameter index can be found in the SEW documentation MOVIDRIVE® Parameter List. Indexes below 8300dec are dealt with directly on the options card and not to be considered as a drive parameter of the inverter.

Parameter index (decimal)	Designation of communications object
8296	Download parameter block
8297	Last PCP index
8298	Cyclical MOVILINK® parameter channel
8299	Acyclical MOVILINK® parameter channel
8300 ... 8800	Drive parameters for MOVIDRIVE® (directly accessible with PCP services "Read" and "Write;" for parameter index see SEW documentation MOVIDRIVE® Parameter List)
8801... 9999	Drive parameters for MOVIDRIVE® (these parameters are accessible only via MOVILINK® parameter channel)
>10000	Table, program, and variable memory (these parameters are accessible only via MOVILINK® parameter channel)

Object description of drive parameters

A detailed description of the drive parameters of the MOVIDRIVE® drive inverter can be found in the SEW documentation MOVIDRIVE® Parameter List. Besides the parameter index, you will find additional information on coding, range of values and meaning of the parameter data.

The object description in the object list is identical for all drive parameters. Even parameters that can only be read receive the attribute Read All/Write All in the object list since the drive inverter performs the corresponding check itself and provides a return code, if necessary. The following table shows the object description of all drive parameters.

Index:	8300 ... 8800
Object code:	7 (Simple Variable)
Data type index:	10 (Octet String)
Length:	4
Local address:	
Password:	
Access groups:	
Access rights:	Read all / Write all
Name[16]:	-
Extension length:	-

"Download parameter block" object

The "Download parameter block" object can be used to write a maximum of 38 drive parameters of the MOVIDRIVE® at the same time with a single write service. Consequently, this object offers the possibility to set the parameters of the drive inverter, for example during the starting phase, with a single call of the write service. Since only a few parameters will generally have to be changed, this parameter block with a maximum of 38 parameters is sufficient for nearly all applications. The user data area is set to 38 x 6 + 2 bytes = 230 bytes (octet string type). The following table shows the structure of the "download parameter block" object.

Octet	Meaning	Note
0	Reserved (0)	
1	Number of parameters	1 ... 38 parameters
2	Index High	1st parameter
3	Index Low	
4	MSB data	
5	Data	
6	Data	
7	LSB data	
8	Index High	
...	...	
223	LSB data	
224	Index High	38th parameter
225	Index Low	
226	MSB data	
227	Data	
228	Data	
229	LSB data	

The "download parameter block" object is handled only locally on the fieldbus option card and defined as listed in the following table.

Index:	8296
Object code:	7 (Simple Variable)
Data type index:	10 (Octet String)
Length:	230
Local address:	
Password:	
Access groups:	
Access rights:	Write all
Name[16]:	-
Extension length:	-

The WRITE service to the "download parameter block" object on the fieldbus option card starts a parameterization mechanism that writes sequentially all parameters listed in the user data area of the object into the DPRAM and, thereby, sets the parameters of the drive inverter. After successful processing of the download parameter block, i.e. all parameters transferred by the INTERBUS interface module were written, the write service concludes with a positive write response. In case of an error, a negative write response is returned. Consequently, the return code contains more exact information on the type of error and the number of the parameter (no.1 ... 38) where the error occurred (see example).

```
Example: Error writing the 11th parameter write-error-response:
Error class: 8  Other
Error code: 0   Other
Additional code High: 11dec Error writing parameter 11
Additional code Low: 15hex Value too high
```

Observe the following note while using the download parameter block:

- Do not execute any factory setting within the download parameter block!
- After activating the parameter lock, all subsequently written parameters are rejected.

"Last PCP index" object

This object is 4 bytes long and returns the numerical value for the last directly accessible index via the PCP services if a read access occurs. PCP accesses to indexes that are larger than this numerical value must be performed via the "acyclical MOVILINK® parameter channel" object.

Index:	8297
Object code:	7 (Simple Variable)
Data type index:	10 (Octet String)
Length:	4
Local address:	
Password:	
Access groups:	
Access rights:	Read all
Name[16]:	-
Extension length:	-

"Cyclical MOVILINK® parameter channel" object

This object is 8 bytes long and contains the cyclical MOVILINK® parameter channel. All MOVILINK® communications services can be performed with the cyclically alternating reading and wiriting of this object. The communications service is performed only with the change of the handshake bit within the management byte. The MOVILINK® parameter channel allows for access to all indexes and, therefore, also to the IPOS variable and program memory.

The following table shows the structure of this communications object. The structure of the paramer channel can be found in the documentation "MOVIDRIVE® Fieldbus Device Profile and Parameter List."

Octet	0	1	2	3	4	5	6	7
Meaning	Mngmt	Res'd	Index High	Index Low	MSB data	Data	Data	LSB data
Note	Mngmt	Res'd	Parameter index		4-byte data			

The "cyclical MOVILINK® parameter channel" object is handled only locally on the fieldbus option card.

Index:	8298
Object code:	7 (Simple Variable)
Data type index:	10 (Octet String)
Length:	8
Local address:	
Password:	
Access groups:	
Access rights:	Read all/Write all
Name[16]:	-
Extension length:	-

The following table shows the process of a parameter access via the cyclical MOVILINK® parameter channel. The service execution is started in the inverter only after the control in the parameter channel has changed the handshake bit. For this purpose, the controller must read the parameter channel at the beginning of the parameterization in order to obtain the current state of the handshake bit in the inverter. With the change of the handshake bit, the master can now implement the evaluation of the parameter channel in the inverter.

The inverter now executes the service coded in the parameter channel und re-enters the service confirmation in the parameter channel. With the controller's next read access to the "cyclical MOVILINK® parameter channel," the channel receives the service confirmation. The following table shows the process of the cyclically called read/write services for the "cyclical MOVILINK® parameter channel."

Control (master)	MOVIDRIVE® (slave)
1. "READ cyclical MOVILINK® parameter channel" to evaluate the state of the handshake bit.	
READ 8298 (parameter channel) → ← Data = parameter channel	
2. Implement the execution of the service coded in the parameter channel with WRITE on the "cyclical MOVILINK® parameter channel" and toggle of the handshake bit.	
WRITE 8298 (parameter channel) → ← OK	
3. READ "cyclical MOVILINK® parameter channel" and evaluation of service confirmation in the parameter channel.	
READ 8298 (parameter channel) → ← Data = parameter channel with result	

"Acyclical MOVILINK® parameter channel" object

The "acyclical MOVILINK® parameter channel" object is 8 bytes long and contains the MOVILINK® parameter channel. This object can be used for acyclical parameter access, i.e., the drive inverter executes the processing of the service coded in the parameter channel every time it receives a WRITE service to this object. The handshake bit is not evaluated! The following table shows the structure of the "acyclical MOVILINK® parameter channel." The structure of the parameter channel can be found in the documentation "MOVIDRIVE® Fieldbus Device Profile and Parameter List."

Octet	0	1	2	3	4	5	6	7
Meaning	Mngmt	Res'd	Index High	Index Low	MSB data	Data	Data	LSB data
Note	Mngmt	Res'd	Parameter index		4-byte data			

In principle, two processes are distinguished for parameterization of the drive inverter via acyclical MOVILINK® parameter channel:

- Parameter channel performs a write service
- Parameter channel performs a read service

Parameter channel performs a write service

If a write service is executed via the acyclical parameter channel (e.g., Write Parameter or Write Parameter Volatile), the inverter responds with the current service confirmation after the service has been executed. An incorrect write access returns the corresponding error code.

This option offers the advantage that the write service can be processed upon sending a single WRITE "MOVILINK® parameter channel" and the service confirmation can be accomplished by evaluating the "Write-Confirmation." The following table shows the execution of write services via the acyclical MOVILINK® parameter channel.

Control (master)	MOVIDRIVE® (slave)
1. Implement the execution of the service coded in the parameter channel with WRITE on the "cyclical MOVILINK® parameter channel" object.	
WRITE 8298 (parameter channel) →	
← Service confirmation (OK/Error code)	

The WRITE service coded in the parameter channel is executed and the service confirmation is returned directly as answer.

Parameter channel performs a read service

To read a parameter via the parameter channel, it is necessary to execute a PCP WRITE service first. The PCP WRITE service determines the standby location for the data of the inverter. A read service must be executed on the acyclical parameter channel so that these data can reach the master. Therefore, the execution of read services via the parameter channel always requires a PCP WRITE and then a PCP READ. The following table shows the execution of read services via the acyclical MOVILINK® parameter channel.

Control (master)	MOVIDRIVE® (slave)
1. Implement the execution of the service coded in the parameter channel with WRITE on the "cyclical MOVILINK® parameter channel" object.	
WRITE 8298 (parameter channel) →	
← OK	
2. READ "cyclical MOVILINK® parameter channel" and evaluation of service confirmation in the parameter channel.	
READ 8298 (parameter channel) →	
← Data = parameter channel with result	

1. Receipt is confirmed immediately; parameter channel is evaluated and requested service is executed.
2. Service confirmation is entered into parameter channel and can be evaluated via READ access in the master.

The acyclical MOVILINK® parameter channel is handled locally only on the fieldbus option card and defined as listed in the following table.

Index:	8299
Object code:	7 (Simple Variable)
Data type index:	10 (Octet String)
Length:	8
Local address:	
Password:	
Access groups:	
Access rights:	Read all/Write all
Name[16]:	-
Extension length:	-

4.4 Parameterization return codes

In case of incorrect parameterization, the drive inverter returns various return codes to the parameter setting master that provide detailed information on the cause of the error. In general, the structural design of these return codes corresponds to EN 50170. The following components are being distinguished:

- Error class
- Error code
- Additional code

These return codes apply to communications interfaces of the MOVIDRIVE®.

Error class

The error class component provides a more exact classification of the error type. The error classes listed in Table 1 are distinghuised in accordance with EN 50710.

Class (hex)	Designation	Meaning
1	vfd state	Status error of the virtual field device
2	application reference	Error in application program
3	definition	Definition error
4	resource	Resource error
5	service	Error at service execution
6	access	Access error
7	ov	Error in object list
8	other	Other error (see Additional Code)

Except for error class 8 = other error, the error class is generated by the communications software of the fieldbus card in case of a faulty communication. Return codes that are provided by the drive inverter system fall under the category error class 8 = other error. The more detailed error breakdown is achieved with the additional code component.

Error code

The error code component allows for a more detailed breakdown of the error cause within the error class and is generated by the communications software of the fieldbus card in case of faulty communication. For error class 8 = other error, only error code = 0 (other error code) is defined. In this case, the detailed breakdown is achieved in the additional code.

Additional code

The additional code contains SEW-specific return codes for faulty parameterization of the drive inverter. They are returned to the master under error class 8 = other error. Table 2 shows all possible codings for the additional code.

Add.-Code high (hex)	Add.-Code low (hex)	Meaning
00	00	No error
00	10	Illegal parameter index
00	11	Function/parameter not implemented
00	12	Read access only
00	13	Parameter lock is active
00	14	Factory setting is active
00	15	Value too large for parameter
00	16	Value too small for parameter
00	17	Required option card missing for this function/parameter
00	18	Error in system software
00	19	Parameter access only via RS485 process interface to X13
00	1A	Parameter access only via RS485 diagnostics interface
00	1B	Parameter is access-protected
00	1C	Controller inhibit required
00	1D	Illegal value for parameter
00	1E	Factory setting was activated
00	1F	Parameter was not saved in EEPROM
00	20	Parameter cannot be changed with released output stage

Special case "Internal communications error"

The return code listed in the following table is returned if a communications error occurs between option card and inverter system. The PCP service transmitted via the fieldbus may not have been executed and should be repeated. If this error occurs again, the drive inverter must be completely switched off and back on again to perform a new initialization.

	Code (dec)	Meaning
Error class:	6	Access
Error code:	2	Hardware fault
Add. code high:	0	-
Add. code low:	0	-

Error correction

Repeat the read or write service. If the error occurs again, the drive inverter should be completely switched off and back on again. If this error occurs permanently, consult the SEW electronics service.

5 Application Examples

This section features small application examples for process data exchange and parameterization of the drive inverter via PCP interface.

5.1 Control via process data

The control of the drive inverter via process data is accomplished through simple reading/writing of program addresses to which the INTERBUS process data of the drive inverter are mapped. For example, a simple STEP7 program for Simatic S7 looks as follows:

```
L  W#16#0006
T  PAW  144   //writing 6hex to PA1 (control word = enable)
L  1500
T  PAW  146   //writing 1500dec to PA2 (speed setpoint value = 300 1/min)
L  W#16#0000
T  PAW  148   //writing 0hex to PA3 (no function based on factory setting)
```

Advanced information on the inverter control via process data channel, especially on the coding of the control and status word, can be found in the manual of the fieldbus device profile.

5.2 Parameterization via PCP Interface

This section describes how parameters and IPOS variables can be read or written via the standardized INTERBUS PCP services "Read" and "Write." The example applies to all INTERBUS interface modules of generation 4 (G4) and is explained in the PHOENIX nomenclature.

The coding examples shown in the following sections are presented in the same way as they are described in the INTERBUS user manual "Peripherals Communication Protocol (PCP)" by Phoenix Contact.

Requirement

The following user manuals should be available:

- INTERBUS user manual "Peripherals Communication Protocol (PCP)," PHOENIX CONTACT, IBS SYS PCP G4 UM
- MOVIDRIVE® manual for Fieldbus Device Profile (publication no. 0919 1615)
- MOVIDRIVE® manual INTERBUS DFI Fieldbus Interface (publ. no. 0919 1410)

5.3 Representation of coding examples

The coding examples shown in the following sections are presented in the same way as they are described in the INTERBUS user manual "Peripherals Communication Protocol (PCP)" by Phoenix Contact.

All information of a PCP service is represented word by word in stacked form, i.e. a word can be regarded as an SPS word (e.g. Simatic data word). In each case, the right side shows a coding example for the MOVIDRIVE® drive inverter. All codings shown in red bold typface are interface or project-specific. All other codings do not change for access to different drives or drive parameters.

The "Communication Reference (CR)" is used to select the drive inverter whose parameters are to be set. In the following examples, the drive inverter was assigned CR = 02 hex in the CMD tool. The index defines the drive parameter that is to be accessed.

Word	Meaning	Coding (hex)
1	Command_Code	00 81
2	Parameter_Count	00 03

Subscriber description of the inverter in the CMD tool

Before the PCP channel of the drive inverter can be used, the subscriber description in the CMD tool must be projected for the inverter.

5.4 Procedure of a parameterization sequence

The Peripherals Communication Protocol (PCP) of the INTERBUS standardizes access to parameter data by INTERBUS subscribers and requires the following procedure:

- Initializing the PCP connection with the "Initiate" service.
- Reading or writing parameters with the "Read" and "Write" services.
- If the communications link is no longer required, it can be terminated with the "Abort" service (the service is not discussed here since it is frequently not required; see PCP manual).
- Initializing the PCP connection with the "Initiate" service.

Access to the drive parameters of the inverters takes place only after the PCP connection has been established with "Initiate_Request." This can be done, for example, in a single equipment startup.

Word	Meaning		Coding (hex)
1	Command_Code = Initiate_Request		00 8B
2	Parameter_Count		00 02
3	-	Comm._Reference	00 02
4	Password	Access_Groups	00 00
Bits	15 ... 8	7 ... 0	

After sending this service, the positive message "Initiate_Confirmation" should be received (for negative message, see the PCP manual).

5.5 Reading a drive parameter

Reading a drive parameter (with index £ 8800) is done with the "Read" service. The drive parameters are generally 4 bytes (1 double word) long.

Example

Reading P130 ramp t11 on RIGHT (index 8470dec = 2116hex)

Word	Meaning		Coding (hex)
1	Command_Code = Read_Request		00 81
2	Parameter_Count		00 03
3	Invoke_ID	Comm._Reference	00 02
4	Index		21 16
5	Subindex	-	00 00
Bits	15 ... 8	7 ... 0	

After sending this service, the positive "Read_Confirmation" message should be received.

Word	Meaning		Coding (hex)
1	Message_Code = Read_Confirmation (+)		80 81
2	Parameter_Count		00 05
3	Invoke_ID	Comm._Reference	00 02
4	Result (+)		00 00
5	-	Length	00 04
6	Data [1]	Data [2]	00 00
7	Data [3]	Data [4]	07 D0
Bits	15 ... 8	7 ... 0	

The parameter data are displayed in Motorola format (Simatic format) as follows:

Data [1] = High Byte	Data [2] = Low Byte	Data [3] = High Byte	Data [4] = Low Byte
00 hex	00 hex	07 hex	D0 hex

00 00 07 D0 hex = 2000 dec (= 2000 ms ramp)

Additional information on the coding of drive parameters can be found in the parameter list in the appendix of the "Fieldbus Device Profile" manual.

Word	Meaning		Coding (hex)
1	Message_Code = Read_Confirmation		80 81
2	Parameter_Count		00 03
3	Invoke_ID	Comm._Reference	00 02
4	Error_Class	Error_Code	08 00
5	Additional_Code		00 10
Bits	15 ... 8	7 ... 0	

The table shows an example of the return code "Value too large for parameter."

5.6 Writing a drive parameter

Writing a drive parameter (with index £ 8800) is done with the "Write" service. The drive parameters are generally 4 bytes (1 double word) long.

Example

Writing the ramp time 1.65 s on P130 "Ramp t11 on RIGHT"

Index: 8470dec = 2116hex

Value: 1.65s = 1650ms = 1650 dec = 0000 0672 hex

The parameter data are displayed in Motorola format (Simatic format) as follows:

Data [1] = High Byte	Data [2] = Low Byte	Data [3] = High Byte	Data [4] = Low Byte
00 hex	00 hex	06 hex	72 hex

Additional information on the coding of drive parameters can be found in the parameter list in the appendix of the "Fieldbus Device Profile" manual.

Word	Meaning		Coding (hex)
1	Command_Code = Write_Request		00 82
2	Parameter_Count		00 05
3	Invoke_ID	Comm._Reference	00 02
4	Index		21 16
5	Subindex	Length	00 04
6	Data [1]	Data [2]	00 00
7	Data [3]	Data [4]	06 72
Bits	15 ... 8	7 ... 0	

Word	Meaning		Coding (hex)
1	Message_Code = Write_Confirmation (+)		80 82
2	Parameter_Count		00 02
3	Invoke_ID	Comm._Reference	00 02
4	Result (+)		00 00
Bits	15 ... 8	7 ... 0	

After sending this service, the positive "Write_Confirmation" message should be received.

Word	Meaning		Coding (hex)
1	Message_Code = Write_Confirmation (-)		80 82
2	Parameter_Count		00 03
3	Invoke_ID	Comm._Reference	00 02
4	Error_Class	Error_Code	08 00
5	Additional_Code		00 15
Bits	15 ... 8	7 ... 0	

The table shows an example of the return code "Value too large for parameter."

5.7 Writing IPOS variables / parameters via MOVILINK® parameter

The drive inverters provide a special parameter access via MOVILINK® parameter channel for universal write access to all data of the drive inverter (parameters, IPOS variables, IPOS program code, etc.). The following mechanism shows how IPOS variables can be changed via the parameter channel.

The acyclical parameter channel can be utilized via index 8299 dec (206B hex).

Example

Writing the value 74565 of IPOS variable H0 = Index 11000 dec (2AF8 hex)

Value to be written = 74565 dec (0001 2345 hex)

Word	Meaning		Coding (hex)
1	Command_Code = Write_Request		00 82
2	Parameter_Count		00 07
3	Invoke_ID	Comm._Reference	00 02
4	Index = MOVILINK parameter channel		20 6B
5	Subindex	Length	00 08
6	Data [1] = Management byte	Data [2] = Reserved	32 00
7	Data [3/4] = Index (e.g., IPOS variable)		2A F8
8	Data [5]	Data [6]	00 01
9	Data [7]	Data [8]	23 45
Bits	15 ... 8	7 ... 0	

After sending this service, the "Write_Confirmation" is issued. The return codes can be used again to evaluate the negative message.

5.8 Reading IPOS variables / parameters via MOVILINK® parameter

The drive inverters provide a special parameter access via MOVILINK® parameter channel for universal read access to all data of the drive inverter (parameters, IPOS variables, IPOS program code, etc.). The following mechanism shows how IPOS variables can be read via the parameter channel. This requires a two-step procedure:

- Writing the MOVILINK® parameter channel with the command "Read IPOS Variable H0"
- Reading the MOVILINK® parameter channel

The MOVILINK® parameter channel (acyclical) can be utilized via index 8299 dec (206B hex).

Example

Reading the IPOS variable H0 = Index 11000 dec (2AF8 hex)

A detailed explanation of the MOVILINK® parameter channel can be found in the "MOVIDRIVE® Fieldbus Device Profile" manual; also observe the notes in the "MOVIDRIVE® Fieldbus Interface INTERBUS DFI11A" manual.

Word	Meaning		Coding (hex)
1	Command_Code = Write_Request		00 82
2	Parameter_Count		00 07
3	Invoke_ID	Comm._Reference	00 02
4	Index = MOVILINK parameter channel		20 6B
5	Subindex	Length	00 08
6	Data [1] = Management byte	Data [2] = Reserved	31 00
7	Data [3/4] = Index (e.g., IPOS variable)		2A F8
8	Data [5]	Data [6]	00 00
9	Data [7]	Data [8]	00 00
Bits	15 ... 8	7 ... 0	

After receiving the positive "Write_Confirmation (+)," a read access to the MOVILINK® parameter channel is performed with which the read data are read into the interface module. These data were previously defined with a read request via "Write_Request."

Word	Meaning		Coding (hex)
1	Command_Code = Read_Request		00 81
2	Parameter_Count		00 03
3	Invoke_ID	Comm._Reference	00 02
4	Index = MOVILINK parameter channel		20 6B
5	Subindex	-	00 00
Bits	15 ... 8	7 ... 0	

After sending this service, the positive "Read_Confirmation" message should be received.

Word	Meaning		Coding (hex)
1	Message_Code = Read_Confirmation (+)		80 81
2	Parameter_Count		00 07
3	Invoke_ID	Comm._Reference	00 02
4	Result (+)		00 00
5	-	Length	00 08
6	Data [1] = Management byte	Data [2] = Reserved	31 00
7	Data [3/4] = Index (e.g., IPOS variable)		2A F8
8	Data [5]	Data [6]	00 01
9	Data [7]	Data [8]	23 45
Bits	15 ... 8	7 ... 0	

Word	Meaning		Coding (hex)
1	Message_Code = Read_Confirmation		80 81
2	Parameter_Count		00 03
3	Invoke_ID	Comm._Reference	00 02
4	Error_Class	Error_Code	08 00
5	Additional_Code		00 10
Bits	15 ... 8	7 ... 0	

The return codes can be used to evaluate the negative message.

5.9 Writing several IPOS variables / parameters via download parameter

The MOVIDRIVE® drive inverters make it possible to write several IPOS variables or parameters simultaneously with a single PCP service using the download parameter block.

The download parameter block is always 230 bytes long. A maximum of 42 drive parameters or IPOS variables can written in one block.

Example

Three values of the inverter are to be written with one "Write_Request."

Name of parameter/variable	Index	Value to be written
IPOS variable H0	11000 dec (2AF8 hex)	1 dec (1 hex)
IPOS variable H1	11001 dec (2AF9 hex)	-40000 dec (FFFF63C0 hex)
P130 ramp t11 on RIGHT	8470 dec (2116 hex)	1500 dec (05DC hex)

After sending this service, the "Write_Confirmation" is issued. The return codes can be used again to evaluate the negative message. Since the individual parameters of the download parameter block are written sequentially in the inverter, a negative "Write_Confirmation" will cause the parameter number where the error occurred to be entered into the High section of the Additional_Codes.

Word	Meaning		Coding (hex)
1	Command_Code = Write_Request		00 82
2	Paraemter_Count = 118 words (= 76 hex)		00 76
3	Invoke_ID	Comm._Reference	00 02
4	Index = Download parameter block		20 68
5	Subindex	Length = 230 bytes (= E6 hex)	00 E6
6	Data [1] = Reserved	Data [2] = Number of parameters	00 03
7	Data [3/4] = Index of first parameter (e.g., IPOS variable H0)		2A F8
8	Data [5]	Data [6]	00 00
9	Data [7]	Data [8]	00 01
10	Data [9/10] = Index of first parameter (e.g., IPOS variable H1)		2A F9
11	Data [11]	Data [12]	FF FF
12	Data [13]	Data [14]	63 C0
13	Data [15/16] = Index of first parameter (P130 ramp t11)		21 16
14	Data [17]	Data [18]	00 00
15	Data [19]	Data [20]	05 DC
...	...	...	...
Bits	15 ... 8	7 ... 0	

After sending this service, the "Write_Confirmation" is issued. The return codes can be used again to evaluate the negative message. Since the individual parameters of the download parameter block are written sequentially in the inverter, a negative "Write_Confirmation" will cause the parameter number where the error occurred to be entered into the High section of the Additional_Codes (see also DFI manual).

6 Appendix

6.1 Compatibility with DFI11 (RS485 Cu)

For INTERBUS applications using RS-485 (Cu) transfer technology that were implemented with the MOVIDRIVE® DFI11 option, the transfer medium can be changed over to the drive inverter at any time by replacing the DFI11 option with the DFI21 option (fiber optic connection technology). The following tables show the compatibility between DFI11 and DFI21. In principle, all DFI11 applications can be replaced by DFI21. The peripheral conditions listed in the tables must be followed, if a fiber optic application with the DFI21 is to be replaced by an RS485 interface with DFI11.

INTERBUS configuration

Supported configurations	DFI11(RS485 Cu)	DFI21(fiber optic link)
ID code: 227 decimal (E3hex)	yes	yes
1 PD + 1 PCP	yes	yes
2 PD + 1 PCP	yes	yes
3 PD + 1 PCP	yes	yes
ID code: 224 decimal (E0hex)	-	yes
1...4 PD + 2 PCP	-	yes
ID code: 225 decimal (E1hex)	-	yes
1 / 2 PD + 4 PCP	-	yes
ID code: 3 decimal (03hex)	-	yes
6 PD	-	yes

Parameter channel (PCP interface)

Supported features	DFI11(RS485 Cu)	DFI21(fiber optic link)
Parameter channel settings:		
Send message length:	243 bytes	243 bytes
Receive message length:	243 bytes	243 bytes
Supported services:		
Read	yes	yes
Write	yes	yes
Elements of the object list:		
8296 download parameter block	yes	yes
8297 last PCP index	-*	yes
8298 cyclical MOVILINK® parameter channel	yes	yes
8299 acyclical MOVILINK® parameter channel	yes	yes
8300 ... 8800 drive parameter	yes	yes

Supported features	DFI11(RS485 Cu)	DFI21(fiber optic link)
8801 ... 9999 drive parameter	yes	yes
>10000 tables, program, variables	yes	yes
Coding of Invoke ID:		
PCP services of the controller:	0	0..7Fhex for control system
PCP services via interface module:	not possible	80..FFhex for interface module
PCP version	1.50**	3.x
Second logical PCP channel for interface module:	no	yes

* Last PCP index

The object "Last PCP index" is not implemented and returns an error message when a read access occurs.

** Different PCP versions

Although the PCP versions are distinguished between DFI11 and DFI21, the PCP interface with the interface module or PLC is identical for both modules. With the exception of the advanced functions of the DFI21 (2 or 4 PCP words, second logical PCP channel, etc.), INTERBUS applications that utilize the PCP channel of the DFI11 can also be used with the DFI21.

6.2 Check list for installation of fiber optic cables

Routing fiber optic cables

- Do not exceed maximum cable length
- Adhere to bending radius
- Do not crimp or kink fiber optic cables
- Do not exceed tensile load during cable installation
- Unroll fiber optic cables only with an unrolling device during installation

Protective measures for fiber optic cables

- Protect/secure against tensile load and inadmissible small bending radii
- Loop-free routing
- Protect against sharp edges
- Install separate from power cables
- Use special cable for routing in special areas (e.g., underground cable or close to welding robots)

Pre-fabricating fiber optic cables

- Strip outer sheath and single core without damaging them
- Secure single core in the connector (strain relief)
- Polish and assemble connector face according to regulations

Calibrating fiber optic cables

- Check the light intensity with respect to limit values (optical diagnostics with CMD tool or fiber optic measuring instrument)

7 Index

A

Abort 29, 30
Acyclical MOVILINK® parameter channel 35
Additional code 38
Application example 40
Assembly 7
Assigning process data 25

B

BA 16
Baud rate 13
Bus Active 16
Bus interface 11

C

Cable Check 16
Cable types 11
CC 16
CMD tool 20
Coding example 41
Communications error 39
Compatibility 6, 48
Configuration Monitoring Diagnosis 20
Configuration of bus structure 21
Configuration offline 21
Configuration online 22
Configuring the bus structure 21
Connector for fiber optic connection 11
Connector pin assignment 12
Cyclical MOVILINK® parameter channel 33

D

Detection of bus end 6
Device parameterization 26, 27
Device type 23
DIP switch 13
Disconnecting 29, 30
Disconnecting the communications link 30
Display elements 15
Download parameter block 32, 46
Drive parameters 31

E

Error class 37
Error code 38
Establishing a link 30
Establishing the communications link 30
Example 40

F

Features 6
Fiber Optic 1 17
Fiber Optic 2 17
Fiber optic connector 11
FO1 17
FO2 17

H

HCS cable 11

I

ID code 22
Ident code 21
Initiate 29, 30
Installation 7
Installation of fiber optic cables 49
Installation of option card 8
Installing fiber optic cables 49
Installing the option card 8
Interface type 23
Internal communications error 39

L

Last PCP index 33
LED BA 16
LED CC 16
LED FO1 17
LED FO2 17
LED RD 16
LED TR 17
LED UL 16
LEDs 15
Link establishment 29

M

Manufacturer name 23
Message length 25
Monitoring 26
MOVILINK® parameter channel 44

N

Number of PCP words 13
Number of process data 13

O

Object description 31
Object directory 31
Offline configuration 21
Online configuration 22

P

Parameter channel 25
Parameterization sequence 41
Parameterization, return codes 37
Parameters in the object directory 31
PCP connection 26
PCP interface 28
PCP length 13, 14
PCP services 29

Performance characteristics 6
Polymer fiber cable 11
Process data channel 21, 22
Process data length 13, 14
Process data manager 25
Program setting 22
Project Planning 18, 20

R

RD 16
Read 29, 30, 36, 42, 44
Read parameter list 27
Reading drive parameters 42
Reading in the bus structure 22
Reading in the configuration frame 22
Reading IPOS variables 44
Reading parameter list 27
Reading parameter values 29, 30
Reading parameters 44
Remote Bus Disable 16
Return codes 37

S

SEW icons 24
Startup 18, 19
Station description 23
Supported parameter channel services 25

T

Topologies 9
    direct interface 9
    Mixed operation 10
TR 17
Transmit 17
Type of station 21

U

UL 16
U-Logic 16
Unit design 7

W

Write 29, 30, 36, 43, 44, 46
Writing drive parameters 43
Writing IPOS variables 44, 46
Writing parameter values 29, 30
Writing parameters 44, 46

SEW-EURODRIVE GmbH & Co · P.O.Box 3023 · D-76642 Bruchsal/Germany · Phone +49-7251-75-0
Fax +49-7251-75-1970 · http://www.SEW-EURODRIVE.com · sew@sew-eurodrive.com

SEW EURODRIVE

SEW-EURODRIVE *around the world*

Argentina *1619 Garin*	*Tel. (0 33 27) 45 72 84* *Fax (0 33 27) 45 72 21*
Australia *Tullamarine, Victoria 3043 (Melbourne)*	*Tel. (03) 99 33 10 00* *Fax (03) 99 33 10 03*
Austria *A-1230 Wien*	*Tel. (01) 6 17 55 00-0* *Fax (01) 6 17 55 00-30*
Belgium *B-1300 Wavre*	*Tel. (0 10) 23 13 11* *Fax (0 10) 23 13 36*
Brazil *07210 Guarulhos-SP*	*Tel. (0 11) 64 60-64 33* *Fax (0 11) 64 80-43 43*
Canada *Bramalea, Ontario L6T 3W1*	*Tel. (9 05) 7 91-15 53* *Fax (9 05) 7 91-29 99*
Chile *RCH-Santiago de Chile*	*Tel. (02) 6 23 82 03* *6 23 81 63* *Fax (02) 6 23 81 79*
China *Tianjin 300457*	*Tel. (0 22) 25 32 26 12* *Fax (0 22) 25 32 26 11*
Colombia *Bogota*	*Tel. (05 71) 5 47 50 50* *Fax (05 71) 5 47 50 44*
Denmark *DK-2670 Greve*	*Tel. 4395 8500* *Fax 4395 8509*
Finland *FIN-15860 Hollola 2*	*Tel. (3) 58 93 00* *Fax (3) 7 80 62 11*
France *F-67506 Haguenau*	*Tel. 03 88 73 67 00* *Fax 03 88 73 66 00*
Great Britain *Normanton, West-Yorkshire WF61QR*	*Tel. 19 24 89 38 55* *Fax 19 24 89 37 02*
Hong Kong *Kowloon, Hong Kong*	*Tel. 2-7 96-04 77* *Fax 2-7 95-91 29*
India *Baroda*	*Tel. (02 65) 83 10 86* *Fax (02 65) 83 10 87*
Italy *I-20020 Solaro (Milano)*	*Tel. 02-96 98 01* *Fax 02-96 79 97 81*
Japan *438 Shizuoka-ken, Iwata-gun, Toyoda-cho*	*Tel. (0 53 83) 7 38 11-13* *Fax (0 53 83) 7 38 14*
Malaysia *81100 Johor Barbru*	*Tel. (07) 3 54 57 07* *3 54 94 09* *Fax (07) 3 54 14 04*
Netherlands *NL-3004 AB Rotterdam*	*Tel. (0 10) 4 46 37 00* *Fax (0 10) 4 15 55 52*
New Zealand *Auckland*	*Tel. (09) 2 74 56 27* *2 74 00 77* *Fax (09) 2 74 01 65*
Norway *N-1539 Moss*	*Tel. (69) 24 10 20* *Fax (69) 24 10 40*
Peru *Lima*	*Tel. (5 11) 349-52 80* *Fax (5 11) 349-30 02*
Portugal *P-3050 Mealhada*	*Tel. (02 31) 20 96 70* *Fax (02 31) 20 36 85*
Singapore *Singapore 63 86 44*	*TeI. 86 21 701-705* *Fax 8 61 28 27*
South Africa *Johannesburg 2013*	*Tel. (0 11) 4 94 43 80* *Fax (0 11) 4 94 23 00*
South Korea *Ansan-City*	*Tel. (03 45) 4 92-80 51* *Fax (03 45) 4 92-80 56*
Spain *E-48170 Zamudio*	*Tel. 9 44 31 84 70* *Fax 9 44 31 84 71*
Sweden *S-55303 Jönköping*	*Tel. (0 36) 34 42 00* *Fax (0 36) 34 42 80*
Switzerland *CH-4142 Münchenstein (Basel)*	*Tel. (0 61) 4 17 17 17* *Fax (0 61) 4 17 17 00*
Thailand *Bangkok*	*Tel. (0 38) 21 45 29 / 30* *Fax (0 38) 21 45 31*
Turkey *Istanbul*	*Tel. (2 16) 4 41 91 63* *Fax (2 16) 3 05 58 67*
USA *Lyman, S.C. 29365 (South Carolina)*	*Tel. (8 64) 4 39-87 92* *75 37* *Fax (8 64) 9 49 30 39*
Venezuela *Valencia*	*Tel. (0 41) 32 95 83* *Fax (0 41) 38 62 75*